CHARLES RIVER STUDY

Hydraulics And Hydrology

INTERIM MEMO #3

Flood Plain Management and Flood Insurance

JUNE 1970

Prepared by

Department of the Army

New England Division, Corps of Engineers

424 Trapelo Road, Waltham, Mass.

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INTRODUCTION

In spite of several decades of continuing construction of flood control measures, flood damage to property and loss of life countrywide has been increasing year after year. This increase has been due to the rapid growth of flood damageable improvements in the flood plains of the rivers and seacoasts. This growth has taken place at a rate greater than that of providing flood control works. An obvious solution to this problem is to exercise greater wisdom in the use of flood plains.

PURPOSE

The purpose of this memo is to present information on flood plain zoning, conservancy zoning and flood insurance with specific reference to the Charles River and its Watershed.

FLOOD PLAINS

The flood plain is actually part of a river, a reserve area carved out or claimed by the river itself to carry or store surplus water in times of flood. Continuing encroachment by construction of new developments in flood-prone areas reduce the hydraulic efficiency of river channels. Flood stages and hazards are thereby increased and the effectiveness of existing flood control works is correspondingly diminished. The floods of March 1968 in southeastern New England caused damage to large areas. This was particularly noticeable where wetlands, which are considered part of the flood plain, had been filled for development purposes.

FLOOD PLAIN ZONING

Flood plain zoning by municipalities in Massachusetts is based on the Zoning Enabling Act (Chapter 40A) enacted in 1954 as since amended.

CHARLES RIVER WATERSHED

The Charles River Watershed in eastern Massachusetts is about 307 square miles in area and includes all or part of 35 municipalities. Twenty-three communities are along the 80 miles of the Charles River.

Information pertaining to flood plain zoning and conservancy districts in the Watershed is summarized in Table 1 and shown on plates 1 and 2.

CONSERVANCY ZONING

Several towns have adopted "Conservancy zones", or a zone with a similar name, under the Massachusetts Zoning Enabling Act. Generally, the limits of these zones are expressed in a fixed distance from the centerline of a stream. Flood Plain Zoning on the other hand usually describes the area that lies below an elevation or a sloped plane. The most carefully drawn conservancy zone known,in Wayland, is essentially a flood plain zone.

FLOOD PLAIN MANAGEMENT SERVICES

A solution to the problem of reducing or eliminating flood damage can be effected by the exercise of greater wisdom in the use of flood plains through adequate knowledge of the flood hazard. Cooperative action by local, State, and Federal governments and private interests is essential. At the Federal level, continuing efforts through existing programs seek to limit future increases in flood damages.

Section 206 of the Flood Control Act approved 14 July 1960 (P. L. 86-645) as amended, authorizes the Secretary of the Army, through the Chief of Engineers, to compile and disseminate information on floods, flood damage potentials, and general criteria for guidance of Federal and non-Federal interests and agencies in the use of flood plain areas. Under this authorization, the Corps of Engineers carried out its Flood Plain Management Services program.

The program includes assistance and guidance to Federal agencies in accordance with requirements of Executive Order 11296. This order is concerned with site location of innumerable Federal improvements, disposal of Federal properties in flood hazard areas, and proper consideration of flood hazard in all Federal grant, loan, mortgage insurance, and land use planning programs. It also includes:

a. Flood Plain Information Reports. These are prepared to provide information to State and local governmental agencies for wide public dissemination. The information is intended to be put to use through planning groups, zoning boards, private citizens, engineering and planning firms, real estate and industrial developers, and others to whom it would be valuable.

b. Technical Services and Guidance. Technical assistance is given states and local governments in the preparation of flood plain regulations. Interpretation of flood data in the reports, provision of additional data, suggestions for floodway areas and evaluation of the effect of those floodways on flood heights, and related assistance are given planners and officials as they prepare and adopt flood plain regulations.

Technical assistance is also given to states and local governments in evaluating and using flood data for making individual decisions concerning flood hazards. This includes brief, preliminary type flood plain information reports, where necessary, for specific sites. Necessary flood information and guidance are provided, on request, to permit wise decisions concerning locations of public buildings, subdivisions, and other land uses. Technical assistance and guidance are also given on flood proofing.

c. Guides, Pamphlets, Related Research. Pamphlets and guides pertaining to flood plain regulations, flood proofing, and other related actions are prepared. They are made available for use of Federal, State and local governments, and citizens in planning and taking action to reduce their flood damage.

d. Comprehensive Flood Damage Prevention Planning. Comprehensive flood damage prevention planning, at all appropriate governmental levels, is the ultimate objective of the program. This brings State and local officials into the planning action to a greater degree and insures increased consideration of alternative measures both structural and non-structural for flood damage reduction.

e. Federal Assistance. Attached plates,3 through 6, show flood profiles and areas inundated by record floods on the Charles River and to principal tributaries. These plans are offered as aids to local authorities to establish areas for flood plain zoning, to plan for limiting development in the flood plains, or to take other measures to reduce future losses due to floods. Additional assistance is available through the flood plain information program.

In considering flood hazards or planning flood plain zoning, optimism is not warranted. Rainfall and runoff in the future will be greater than previously experienced. Consequently, greater areas of flooding is a certainty.

FLOOD INSURANCE

A National Flood Insurance Program is available to communities which have experienced flood damages and qualify under the provisions of the National Flood Insurance Act of 1968, as amended.

This statute, administered by the Federal Insurance Administration of the Department of Housing and Urban Development (HUD), utilizes services of the private insurance industry, and provides for Federal subsidization of flood insurance on single to four-family structures and small business properties, and their contents. The insurance covers damage caused by overflow of either inland or tidal waters on flood-prone land.

The initiative in obtaining flood insurance coverage must be taken by a community through its legislative body. The community must demonstrate a public interest in, and need for, such coverage and also give satisfactory assurance that by 31 December 1971 it will adopt adequate land use and control measures. Such measures should take into account the relation between first-floor elevations and the anticipated level of the 100-year flood for the purpose of protecting structures and their contents from the damage that could result from such a flood. After 31 December 1971, the law provides that no coverage will be available in communities until such time as they have adopted adequate land use and control measures.

Upon submission of satisfactory evidence of positive interest, a community is placed on a list of those eligible for rate-making studies. When the rate-making study has been completed and satisfactory assurances of land use and control measures submitted, a community is declared eligible for flood insurance, and its property owners may obtain coverage.

Studies to establish actuarial rates or to determine the extent to which flood protection measures affect such rates, will be conducted by several agencies of the Federal government, including the Corps of Engineers, U.S. Army. There are also many private engineers and land planners who are qualified to provide assistance.

LIST OF PLATES

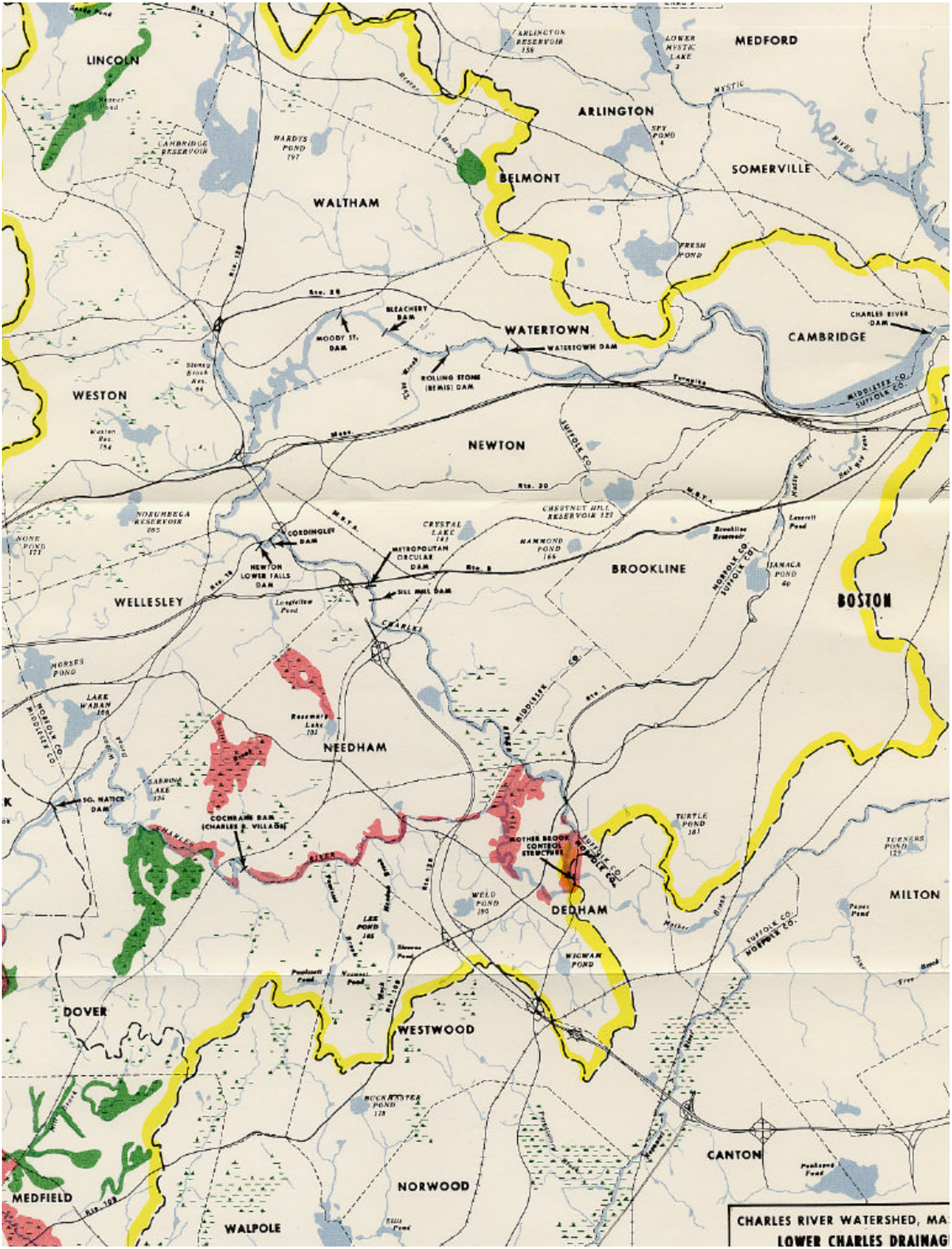
TABLE I

CHARLES RIVER STUDY

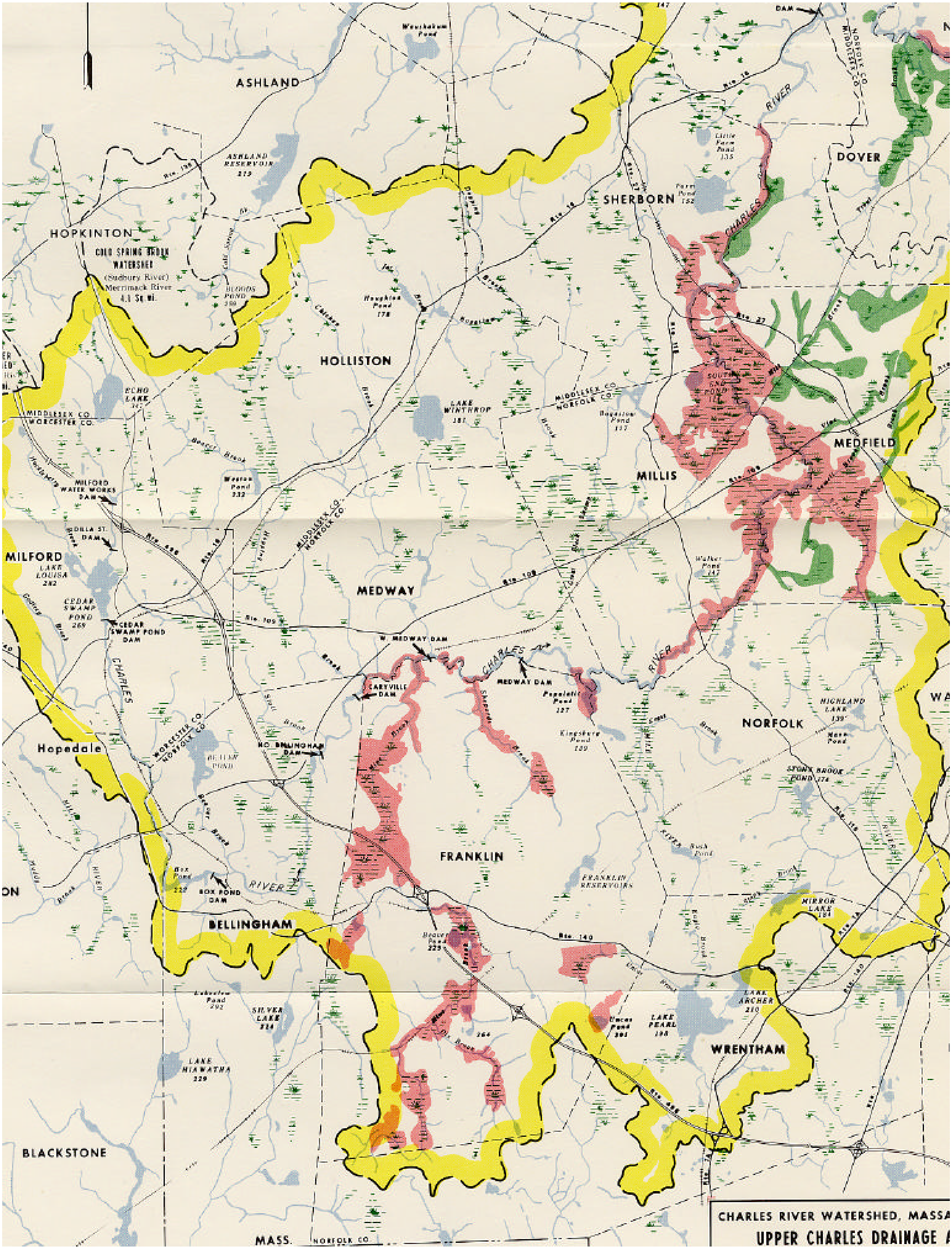
SUMMARY
OF
FLOOD PLAIN ZONING
APRIL 1970

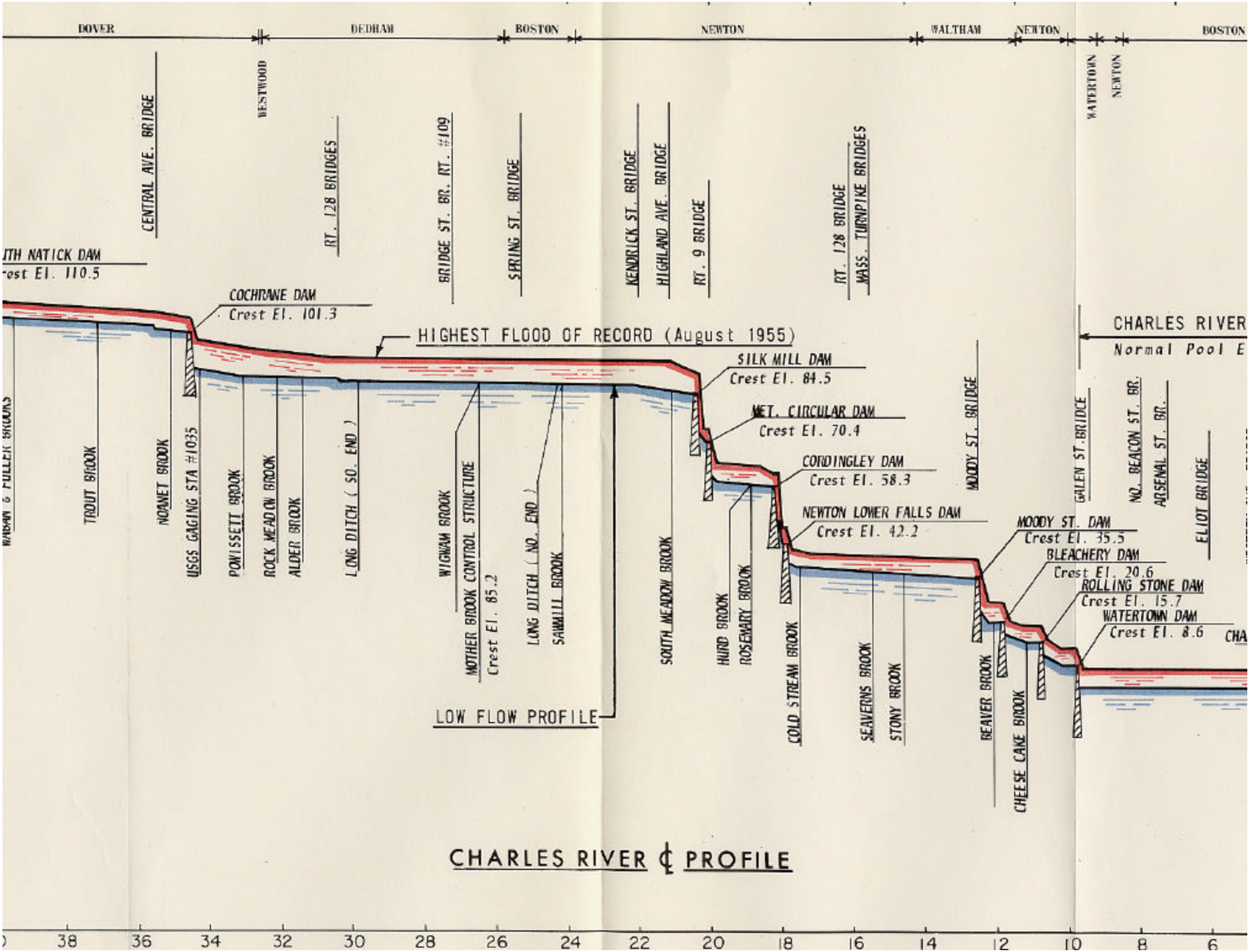
City or Town	Percent of Area in Charles R. Watershed	Frontage on Charles River		Frontage on Principal Tributaries			Approximate Area Flood Plain Zoned		Flood Plain Zoning Adopted	Conservancy Zoning Adopted
		Left Bank Miles	Right Bank Miles	Name	Left Bank Miles	Right Bank Miles	Area Acres	Elevations MSL		
1. Ashland	4.3									
2. Arlington	6.3									
3. Bellingham	42.0	8.78	6.50	Hopping Brook	0.4	0.4				
				Beaver Brook	1.4	1.4				
4. Belmont	40.0									Yes
5. Boston	57.2	0.87	10.44	Muddy River	0.0	2.2				
6. Brookline	100.0			Muddy River	2.2	0.0				
7. Cambridge	64.6	6.13								
8. Dedham	66.9	6.17	6.87	Mother Brook			416	95	Yes	
				Diversion	0.1	0.1				
9. Dover	85.5		10.77	Trout Brook	2.0	2.0				Yes.
10. Foxboro	0.1									
11. Franklin	90.7		4.41	Shepard Brook	1.5	1.5	2,450	Varies	Yes	
				Mine Brook	5.0	5.0				
12. Holliston	99.5			Bogastow Brk	2.9	3.0				
				Chicken Brk	4.1	4.1				
				Hopping Brk	4.0	4.0				
13. Hopedale	18.8		1.77							
14. Hopkinton	10.2	0.26	0.26							Yes
15. Lexington	29.5									
16. Lincoln	61.3			Stony Brook	3.0	3.0				
17. Medfield	78.1		9.06	Stop River	2.0	2.0	1,415	125	Yes	Yes
18. Medway	100.0	5.78	1.17	Chicken Brk	3.3	3.3				
				Hopping Brk	2.2	2.2				
19. Mendon	1.6		0.91							
20. Milford	86.3	5.64	4.90	Lake Louise						
				Outlet	0.3	0.3				
21. Millis	100.0	10.27	1.61	Bogastow Brk	4.5	4.5	1,280	125	Yes	
22. Natick	55.2	2.95	2.87	Davis Brook	2.0	2.0				
				Indian Brook	1.8	1.0				
23. Needham	100.0	11.93		Fuller Brook	1.5	1.5	672	Varies	Yes	
24. Newton	100.0		11.88							
25. Norfolk	99.7		2.04	Mill River	1.5	1.5				
				Stop River	2.0	1.0				
26. Sherborn	83.4	4.65		Indian River	0.5	1.5	343	125	Yes	
				Farm Pond						
				Outlet	0.5	0.5				
				Sewall Brk	3.0	3.0				
				Bogastow Brk	0.1	0.0				
27. Somerville	33.9									
28. Walpole	1.0			Stop River	0.0	1.0			Yes	
29. Waltham	100.0	3.21	2.72	Stony Brk	2.0	0.0				
30. Watertown	86.3	4.47	0.70							
31. Wayland	2.6									
32. Wellesley	100.0	5.24		Waban Brk	0.5	0.5			Yes	Yes
				Fuller Brk	2.8	2.8				
33. Weston	91.0	2.59		Stony Brk	2.5	4.7				
34. Westwood	34.0		0.06							
35. Wrentham	43.4									

NOTES: Left or Right bank designations are moving from source to mouth.
Principal tributaries are limited to non-urban waterways
Areas of flood plain zoning are based on approximate measurements on USGS Maps 1" = 2,000

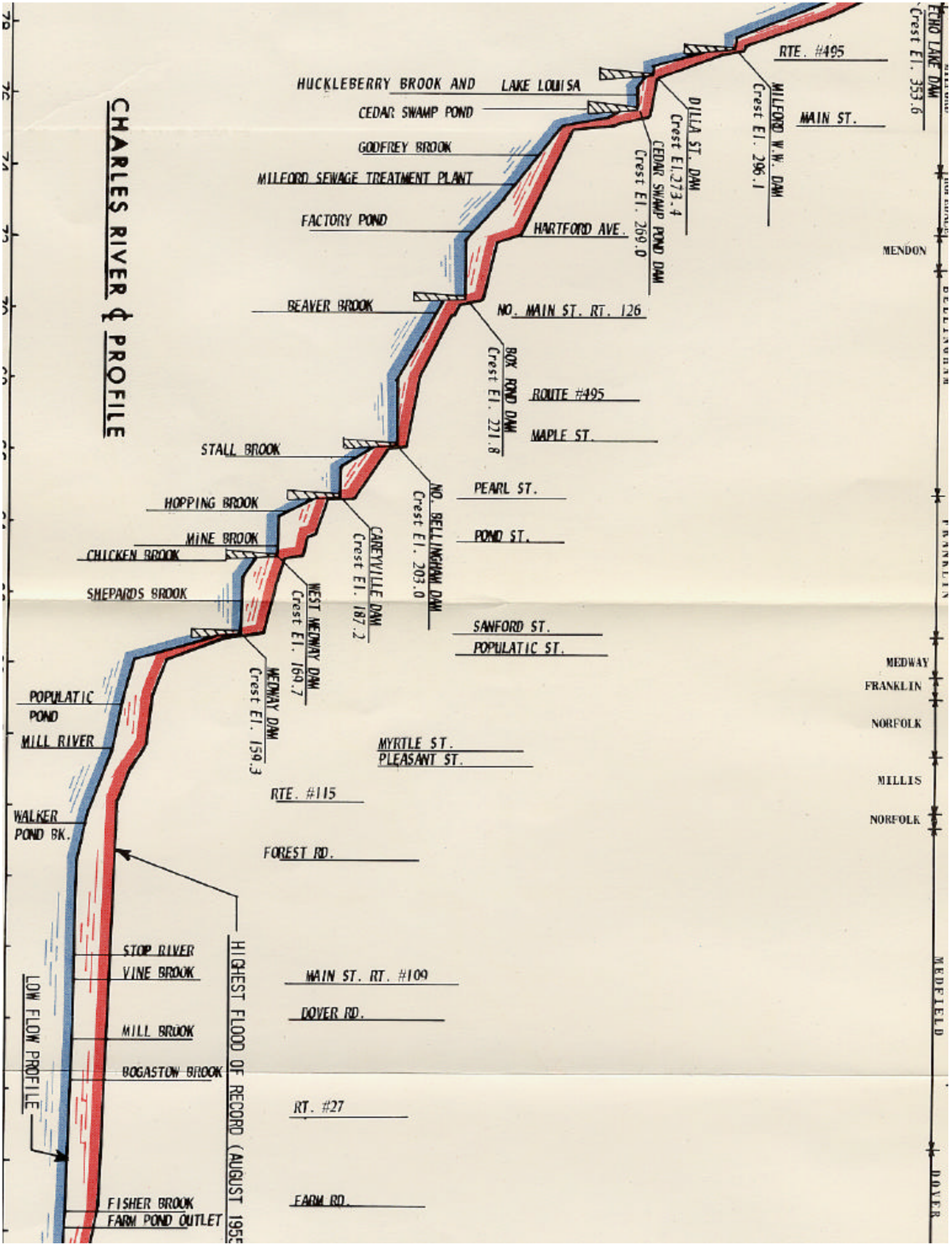


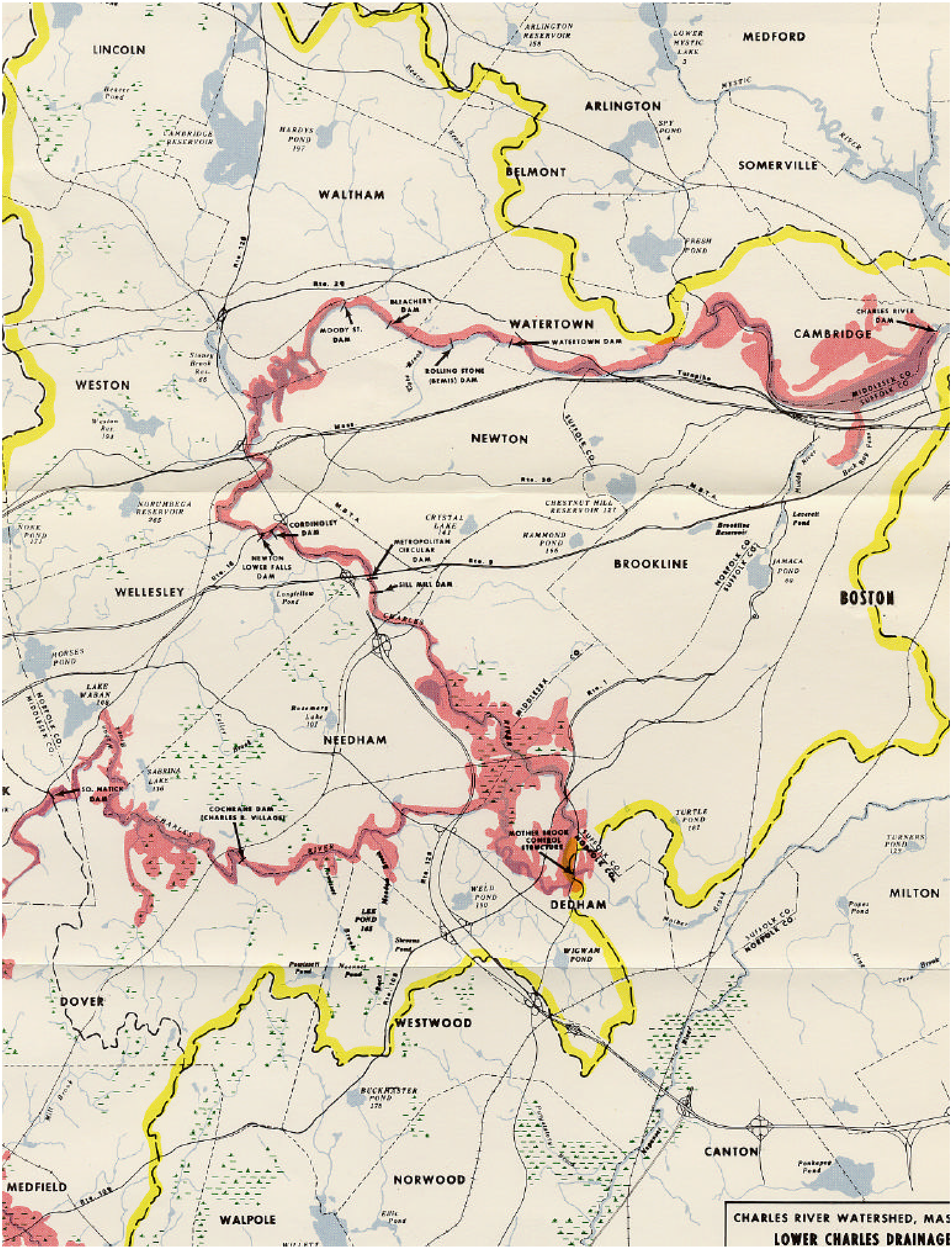
CHARLES RIVER WATERSHED, MA
LOWER CHARLES DRAINAG

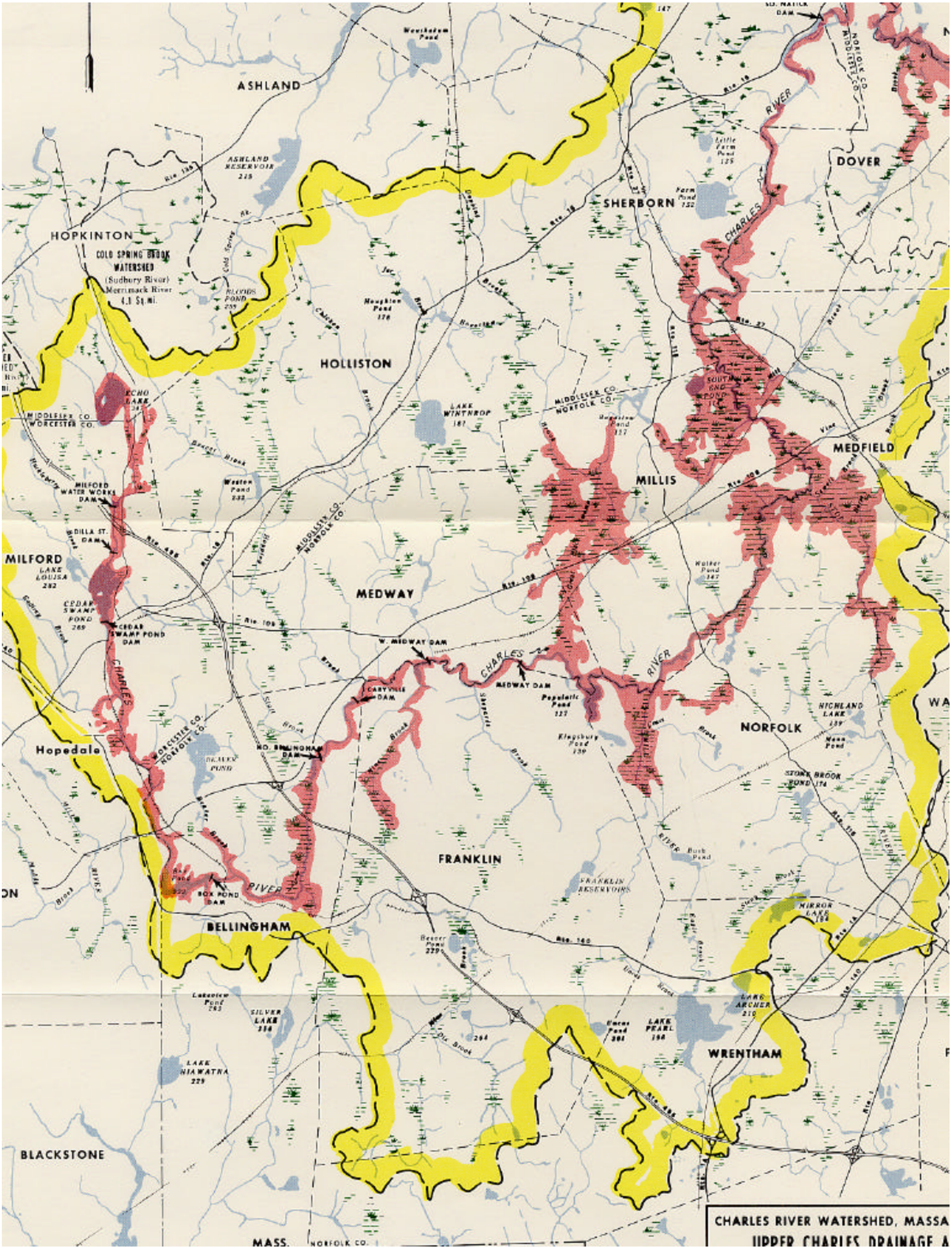

ASHLAND
Waushakum Pond
ASHLAND RESERVOIR 213
HOPKINTON
COLD SPRING BROOK WATERSHED (Sudbury River) Merrimack River 4.1 Sq. mi.
SHERBORN
Little Farm Pond 135
Farm Pond 152
DOVER
CHARLES RIVER
HOLLISTON
Houghton Pond 178
ECHO LAKE
MIDDLESEX CO.
WORCESTER CO.
LAKE WINTHROP 181
MIDDLESEX CO.
NORFOLK CO.
SOUTH END POND
Bogastow Pond 157
MEDFIELD
MILLIS
MILFORD WATER WORKS DAM
Weston Pond 232
DILLA ST. DAM
MILFORD
LAKE LOUISA 282
CEDAR SWAMP POND 265
CEDAR SWAMP POND DAM
MEDWAY
Walker Pond 147
W. MEDWAY DAM
CARYVILLE DAM
MEDWAY DAM
Populatic Pond 127
Kingsbury Pond 189
NORFOLK
HIGHLAND LAKE 139
STONY BROOK POND 174
Hopedale
WORCESTER CO.
NORFOLK CO.
BEAVER POND
NO. BELLINGHAM DAM
FRANKLIN
FRANKLIN RESERVOIRS
Box Pond 222
BOX POND DAM
BELLINGHAM
MIRROR LAKE 124
Beaver Pond 225
LAKE ARCHER 210
Lakeview Pond 292
SILVER LAKE 224
Uncas Pond 201
LAKE PEARL 198
WRENTHAM
LAKE HIAWATHA 229
BLACKSTONE
MASS.
NORFOLK CO.
CHARLES RIVER WATERSHED, MASSA
UPPER CHARLES DRAINAGE A



CHARLES RIVER ℄ PROFILE


CHARLES RIVER & PROFILE
ECHO LAKE DAM
Crest El. 353.6
RTE. #495
HUCKLEBERRY BROOK AND
LAKE LOUISA
CEDAR SWAMP POND
DILLA ST. DAM
Crest El. 273.4
MILFORD W.W. DAM
Crest El. 296.1
MAIN ST.
GODFREY BROOK
MILFORD SEWAGE TREATMENT PLANT
CEDAR SWAMP POND DAM
Crest El. 269.0
FACTORY POND
HARTFORD AVE.
MENDON
BEAVER BROOK
NO. MAIN ST. RT. 126
BOX POND DAM
Crest El. 221.8
ROUTE #495
MAPLE ST.
STALL BROOK
NO. BELLINGHAM DAM
Crest El. 203.0
PEARL ST.
HOPPING BROOK
POND ST.
MINE BROOK
CHICKEN BROOK
CAREYVILLE DAM
Crest El. 187.2
WEST MEDWAY DAM
Crest El. 169.7
SHEPARDS BROOK
SAWFORD ST.
POPULATIC ST.
MEDWAY DAM
Crest El. 159.3
MEDWAY
FRANKLIN
NORFOLK
POPULATIC POND
MILL RIVER
MYRTLE ST.
PLEASANT ST.
MILLIS
NORFOLK
RTE. #115
WALKER POND BK.
FOREST RD.
HIGHEST FLOOD OF RECORD (AUGUST 1955
STOP RIVER
VINE BROOK
MAIN ST. RT. #109
DOVER RD.
LOW FLOW PROFILE
MILL BROOK
BOGASTOW BROOK
MEDFIELD
RT. #27
FISHER BROOK
FARM POND OUTLET
FARM RD.
DOVER


LINCOLN
ARLINGTON RESERVOIR 188
LOWER MYSTIC LAKE 3
MEDFORD
Beaver Pond
ARLINGTON
MYSTIC RIVER
CAMBRIDGE RESERVOIR
HARDYS POND 197
SPY POND 4
SOMERVILLE
BELMONT
WALTHAM
FRESH POND
Rte. 128
Rte. 20
BLEACHERY DAM
MOODY ST. DAM
WATERTOWN
WATERTOWN DAM
CHARLES RIVER DAM
CAMBRIDGE
ROLLING STONE (BEMIS) DAM
Stony Brook Res. 66
WESTON
Turnpike
MIDDLESEX CO.
SUFFOLK CO.
NEWTON
SUFFOLK CO.
Rte. 30
M.B.T.A.
Muddy River
Back Bay Fens
NORUMBEGA RESERVOIR 265
CHESTNUT HILL RESERVOIR 127
CRYSTAL LAKE 141
CORDINGLEY DAM
NEWTON LOWER FALLS DAM
METROPOLITAN CIRCULAR DAM
HAMMOND POND 166
Leverett Pond
Brookline Reservoir
BROOKLINE
NORFOLK CO.
SUFFOLK CO.
JAMAICA POND 89
Rte. 9
Rte. 16
WELLESLEY
SILL MILL DAM
Longfellow Pond
BOSTON
CHARLES
HORSES POND
LAKE WABAN 109
NORFOLK CO.
MIDDLESEX CO.
Rosemary Lake 107
NEEDHAM
MIDDLESEX CO.
Rte. 1
RIVER
SABRINA LAKE 136
SO. NATICK DAM
COCHRANE DAM (CHARLES R. VILLAGE)
CHARLES RIVER
MOTHER BROOK CONTROL STRUCTURE
SUFFOLK CO.
NORFOLK CO.
TURTLE POND 182
TURNERS POND 123
WELD POND 150
DEDHAM
MILTON
Mother Brook
LEE POND 145
Pine Brook
SUFFOLK CO.
NORFOLK CO.
WIGWAM POND
DOVER
WESTWOOD
BUCKMASTER POND 178
CANTON
Ponkapoag Pond
NORWOOD
MEDFIELD
Rte. 109
WALPOLE
Ellis Pond
CHARLES RIVER WATERSHED, MAS
LOWER CHARLES DRAINAGE



CHARLES RIVER WATERSHED, MASSA

UPPER CHARLES DRAINAGE A